NuDAM-6000 DDE Server ver.6.1

User Guide

CONTENTS

CONTENTS 2

INTRODUCTION TO NUDAM-6000 DDE SERVER 3

1.1 WHAT IS DDE? 3

1.2 DDE CONVERSATION 4

GETTING STARTED 6

2.1 NUDAM-6000 I/O DDE SERVER INSTALLATION 6

2.1.1 Installation 6

2.2 NUDAM-6000 I/O DDE SERVER CONFIGURATION 8

2.2.1 /Configure/Comm Port Configuration 8

2.2.2 /Configure/Topic Definition 10

2.2.3 /Configure/DDE Server Settings 12

USING NUDAM-6000 I/O DDE SERVER WITH INTOUCH 14

3.1 DDE ITEM NAMES DEFINITION IN INTOUCH 14

3.2 MONITOR THE COMMUNICATION STATUS OF MODULES 19

3.3 MONITOR THE STATUS OF AN DDE CONVERSATION 20

DDE ITEM NAMES IN NUDAM-6000 DDE SERVER 22

4.1 SPECIAL COMMAND SET 22

4.2 NUDAM-6017, 6018 23

4.3 NUDAM-6011, 6012, 6013, 6014D 24

4.4 NUDAM-6021 25

4.4 NUDAM-6024 26

4.5 NUDAM-6050, 6052, 6053, 6054, 6060, 6063 27

4.6 NUDAM-6056, 6058 29

4.7 NUDAM-6080 30

4.7 TABLE FOR ALL ITEMS 32

APPENDIX INTOUCH SAMPLE PROGRAM 37

1

Introduction to NuDAM-6000 DDE Server

NuDAM-6000 I/O DDE Server is an application for the Microsoft Windows 95 and Windows NT operating systems. It acts as a DDE (Dynamic Data Exchange) *Server* and allows other Windows application programs to access data from NuDAM-6000 series Modules. NuDAM-6000 I/O DDE Server communicates with the NuDAM-6000 series Modules via serial lines. It may be used with Wonderware InTouch and any Microsoft Windows program that is capable of acting as a DDE *Client*.

1.1 What is DDE?

DDE (Dynamic Data Exchange) is a communication protocol designed by Microsoft to allow concurrently running programs in the Windows environment to exchange data and instructions with each other. It implements a *client-server* relationship between the applications. The *server* application provides the data and accepts requests from any other application interested in the data. The requesting applications are called *clients* which can both read and write data maintained by the server. Some applications such as InTouch and Microsoft Excel can simultaneously be both a *client* and a *server*.

Client applications can use DDE for *one-time data transfers* or for *continuous data exchanges* in which updates are sent as soon as new information is available. For *one-time data transfers*, the client application only ***requests*** the "snapshot" data from the server application. For example, as a macro for report generation is executed in Excel, a link to another DDE program will be set up to request the specified data. The link will be terminated after the requested data is received. Then the received data are used to generate reports.

The *continuous data exchanges* mode is also named “hot link”. While a client application sets up a link to another DDE program, it requests the *server* application to ***advise*** the client whenever a specific item's value changes. These data links will remain active until either the *client* or *server* program terminates the link or the conversation. It is a very efficient means of exchanging data because once the link has been established no communication occurs until the specified data value changes. InTouch uses DDE to communicate with I/O device drivers and other DDE application programs.

For InTouch, if the tagname are defined as I/O type, they can read or write their values to or from another DDE compliant Windows program. For example, InTouch can read or write their values to Excel, and Excel can also read or write data to InTouch Database. Whenever the data from source are updated, the remote data are updated automatically as soon as new information is available. DDE can be used to dispatch control instructions to process-connected instruments. With this ability, two or more related applications can be combined together to make up a large size of *super application*. For example, Excel spreadsheet can perform the optimal calculation for production. Thus, Excel may read data from InTouch database, which are accessed from I/O controllers or sensors. Reference to the data, the Excel spreadsheet performs some complicated calculation. InTouch reads the calculated result back from Excel and then uses this optimal value to control various production parameters.

1.2 DDE Conversation

Two Windows application wishing to exchange data must establish a conversation. The client opens a channel to the server application by specifying:

- ***Server Application Name***
  For NuDAM-6000 DDE Server, the application name is NuDAM.
- ***Topic (Logical Device) Name***
  The DDE topic is a general classification of data within which multiple data items may be "discussed" (exchanged) during the conversation. For NuDAM-6000 DDE Server, the topic might be a NuDAM module name, e.g. NM6011. The topic is active whenever at least one conversation has been established between the server’ s logical device and the outside world’ s applications (client). The topic is de-active when the last conversation to a topic has terminated.

- ***Items/Tagnames***
  Items are individual pieces of data that are passed between applications. An item is active whenever any DDE conversation is referencing this item. All the valid item names for NuDAM-6000 DDE server are mentioned in chapter 4 of this manual. For example, the item name is "*ADI*" for client application (e.g. InTouch) to get the digital input data of NuDAM-6011.Please refer to the related chapter for the details.

The following statement is the DDE address convention for representing an DDE conversation:

Application|*Topic*!*Item*

For example, to get the digital input data of NuDAM-6011 through NuDAM-6000 DDE Server, the conversation might be the following (assume the topic name is defined as NM6011):

NuDAM|*NM6011*!*ADI*

2

Getting Started

2.1 NuDAM-6000 I/O DDE Server Installation

2.1.1 Installation

The *NuDAM-6000 DDE Server* Setup program provided by ADLink's *Manual & Software Utility* CD performs all tasks necessary for complete installation.

step 1. Insert the ADLink's "Manual & Software Utility" CD into your CD-ROM drive.

step 2. Click the *Start* button on the Taskbar, then choose *Run.*

step 3. Type *x*:\setup (*x* identifies the drive that contains the compact disc) in *Open* text box, then click *OK*.

step 4. Setup first displays the main screen. Select *Software Package*.

step 5. Setup then displays the ADLink's software products screen. Select *InTouch & DDE Server*.

Setup then prompts the following screen. Select *NuDAM 6000 DDE*.

NuDAM-6000 DDE Setup first displays a Welcome dialog box. Please click Next > to go on installation.

Setup then prompts a *user information* dialog box including N*ame*, C*ompany* and *Serial Number* text fields. The "Serial Number" field must be filled in correctly, otherwise the NuDAM-6000 DDE Server will run in *DEMO* version.
Setup then prompts a dialog box for you to specify the destination directory for NuDAM-6000 DDE Server. The default path is C:\ADLink\NuDDE6. If you want to install NuDAM-6000 DDE Server in another directory, please click Browse button to change the destination directory.

Then you click Next button to go on the installation.

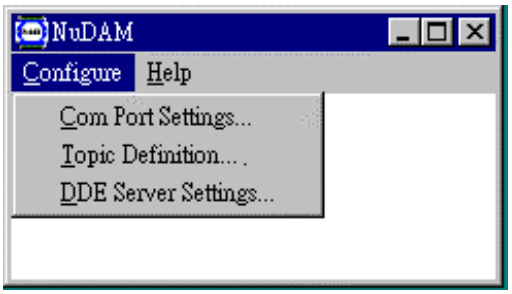
While the installation is completed, the Install directory should contain the following files:

File/Sub-directory	Description
Samples <DIR>	InTouch Sample programs
Samples\NuDAM.cfg	Configuration file for running sample programs
NuDAM.exe	NuDAM 6000 series 32-bit DDE Server Program
NuDAM32.exe	NuDAM 6000 series Administrating Utility
NuDAM.hlp	NuDAM 6000 series 32-bit DDE Server Help File
NuDAM.cnt	NuDAM 6000 series 32-bit DDE Server Help

	Contents File
Wwdlg32.dll	Required DLL file for running NuDAM-6000 DDE server program
NuDDE6.pdf	NuDAM-6000 DDE Server User' s Manual

2.2 NuDAM-6000 I/O DDE Server Configuration

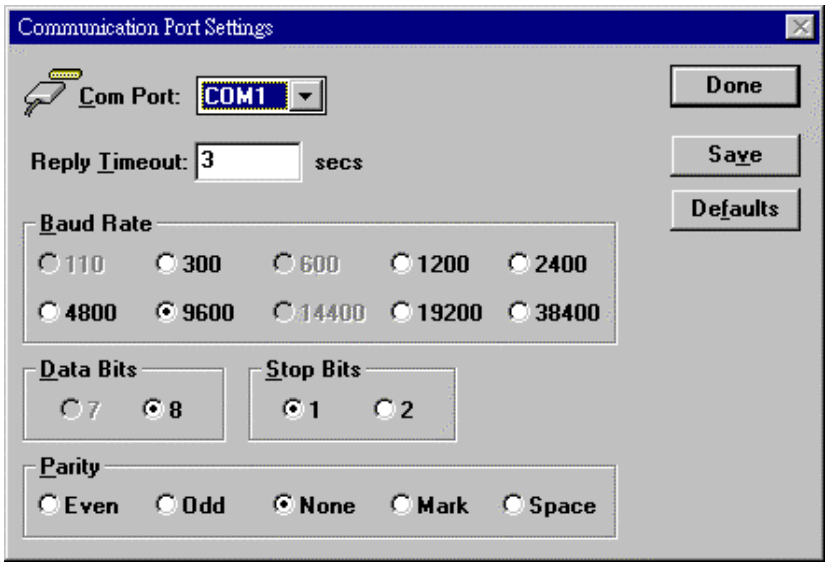
For NuDAM-6000 I/O DDE Server to perform properly, NuDAM-6000 DDE server configuration is required before its operation. To perform the required configurations, start up NuDAM-6000 I/O DDE Server by clicking *NuDAM-6000 DDE Server V6.01* from *program files* menu and then the NuDAM main window is shown as follows:



The configuration items include Com Port settings, Topic Definition and DDE Server Settings. The detail of the configuration items is described in the following sections.

2.2.1 /Configure/Comm Port Configuration

To configure the communication ports, which are used to communicate with NuDAM Modules, select *Com Port Setting* from Configuration Menu in NuDAM main window. The "Communication Port Settings" dialog box is as follows:



The fields and buttons in *Communication Port Settings* dialog box are described in the following:

Comm Port: Select the communication port for this configuration

Reply Timeout: This field is used to input the amount of time (in seconds) the NuDAM modules on this communication port will be given to reply to commands from the NuDAM-6000 DDE Server. The **Timeout** message is sent out when a NuDAM module fails to respond. The value is valid from 1 to 32 and the default value is 3 seconds.

Note: Except that the Baud Rate is lower than 2400, the default value of 3 seconds should be sufficient for most NuDAM modules.

Parity: Select the Parity setting which matches the configuration of the NuDAM modules on this communication port. The default setting is ***None.***

Stop Bits: Select the appropriate number of "Stop Bits" for the NuDAM Modules on this communication port. The default setting is 1.

Baud Rate: Select the Baud Rate for the NuDAM Modules on this communication port. The default setting is ***9600.***

Note **:**

1. The settings for all the modules on the same communication port have to be the same.
2. If you wish to change the ***Baud Rate*** or ***Checksum settings*** of ***NuDAM Modules,*** it is required to use ***NuDAM Administrating utility,*** accompanied with the modules, to perform the modifications. Hence, the settings for ***NuDAM-6000 I/O DDE Server*** must be the same as those on the modules. Please refer to the corresponding user's manuals of ***NuDAM*** modules you wish to operate for the details.

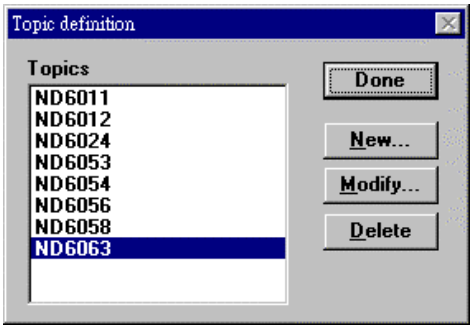
Done Push this button to close the dialog box.

Save Push this button to save the settings after the configuration is finished.

Defaults Set all the settings as the default values.

2.2.2 /Configure/Topic Definition

To define the Topics, select *Topic Definition* from Configuration Menu in NuDAM main window. The "*Topic Definition*" dialog box is as follows:



The fields and buttons in *Topic Definition* dialog box are described in the following:

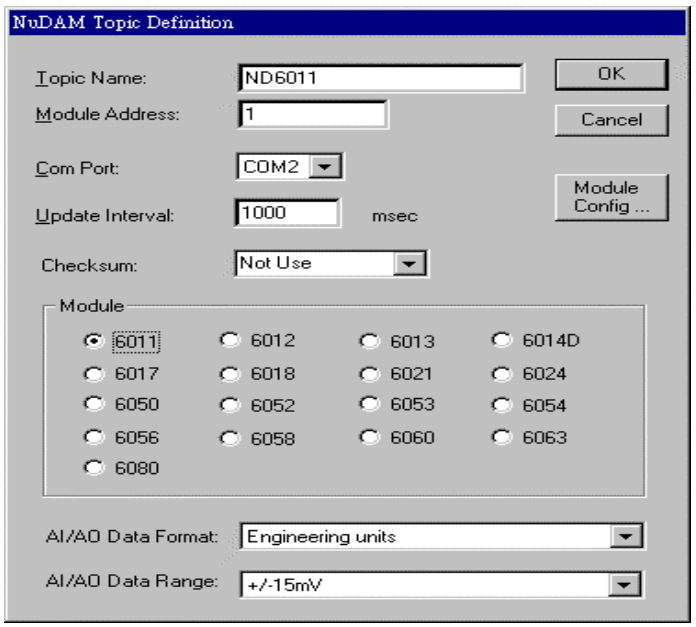
Done Push this button to close the dialog box.

New Define a new topic and the ***NuDAM Topic Definition*** dialog box displays as the figure below.

Modify This button appears only as at least one topic is defined. Push this button to modify the settings for the selected topic.

Delete This button appears only as at least one topic is defined. Push this button to delete the selected topics.

The following section shows the ***NuDAM Topic Definition*** dialog box and gives the detailed description of each field:



Topic Name: This field is used to enter a **Topic Name**. (The same DDE Topic Name is entered in the **InTouch** "DDE Access Name definition" dialog box described in the section 3.1). The topic must be a unique name that is matched by the DDE clients (for example InTouch). **Topic Name** can be up to 32 characters long.

Comm Port: Associate the topic with a communication port (additional topics may be associated with this same port at a later time).

Module Address: The address of the ***NuDAM*** mode configured. The valid range of the module Address is from 0 to 255. The default value is 1.

AI/AO Data Format: The data format setting of Analog Input or Output for the ***NuDAM*** module configured. The field is only available for the modules support AI (6011, 6012, 6013, 6014D, 6017 and 6018) or AO (6021, 6024).

AI/AO Data Range: The data range setting of Analog Input or Output for the ***NuDAM*** module configured. The field is only available for the modules support AI (6011, 6012, 6013, 6014D, 6017 and 6018) or AO (6021, 6024).

Update Interval: This field tells the server how often it will try to poll the data from the module associated to the topic defined. The valid range of **Update Interval** is from 1 to 65535 and the default value is 1000(msec).

Module: The NuDAM module name associated to the topic defined. The default setting is ***6011***.

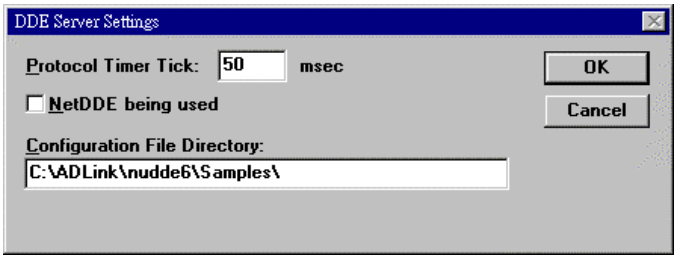
Push this button to invoke ***NuDAM Administrating utility*** for module configuration. Please be sure this utility has been installed in your system.

Note: If you wish to change the ***address, AI/AO Data Format*** or ***AI/AO Data Range*** settings of ***NuDAM Modules,*** it is required to use ***NuDAM Administrating utility,*** accompanied with the modules, to perform the modifications. Hence, the module address, AI/AO Data Format and AI/AO Data Range settings for ***NuDAM-6000 I/O DDE Server*** must be the same as those on the module. Please refer to the corresponding user's manual of ***NuDAM*** modules you wish to operate for the details.

2.2.3 /Configure/DDE Server Settings

A number of parameters that controls the internal operation of the Server can be set. In most cases, the default settings for these parameters provide good performance and do not require changing. However, they can be changed to fine-tune the Server for a specific environment. To configure the NuDAM-6000

DDE Server, select *DDE Server Settings* from Configuration Menu in NuDAM main window. The "*DDE Server Settings* " dialog box is as follows:



The fields and buttons in dialog box above are described in the following:

Configuration File Directory: This field is used to specify the path (disk drive and directory) in which the NuDAM-6000 DDE server will save its configuration file. NuDAM-6000 DDE server will use this path to load the configuration file the next time it is started. The default path is the path that the NuDAM-6000 DDE Server program located.

Note: Only the "path" may be modified with this field. The configuration file is always named NuDAM.cfg.

Protocol Timer Tick: This field is used to change the frequency, where the Server executes the communication protocol. The valid range of the **Protocol Timer Tick** is from 1 to 65535 and the default value is ***50 msec.***

NetDDE being used: This field must be checked when ***Wonderware NetDDE*** is used.

Cancel Push this button to close "*DDE Server Settings*" dialog box and cancel this command.

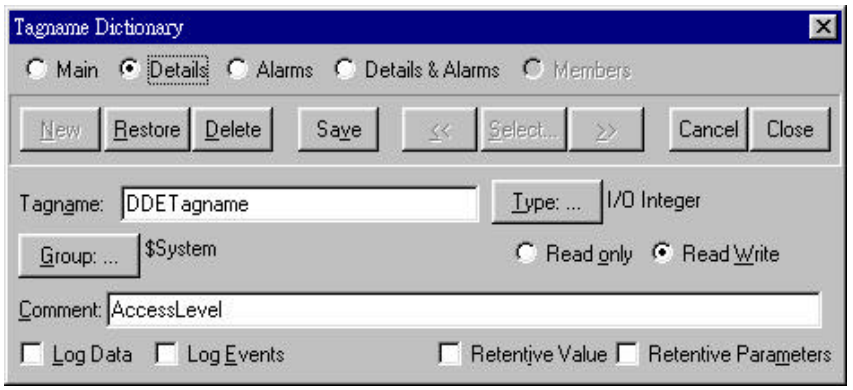
OK Push this button to save the settings and close "*DDE Server Settings*" dialog box after the configuration is finished.

3

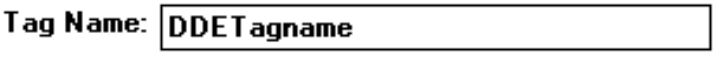
Using NuDAM-6000 I/O DDE Server with InTouch

3.1 DDE Item Names Definition in InTouch

For InTouch, the DDE item name can be defined in *Tag Name Dictionary* to read/write data from other applications. To define the tagnames, invoke the */Special/Tag Name Dictionary...* command (in **WindowMaker**). The " Tagname Dictionary " dialog box will appear:

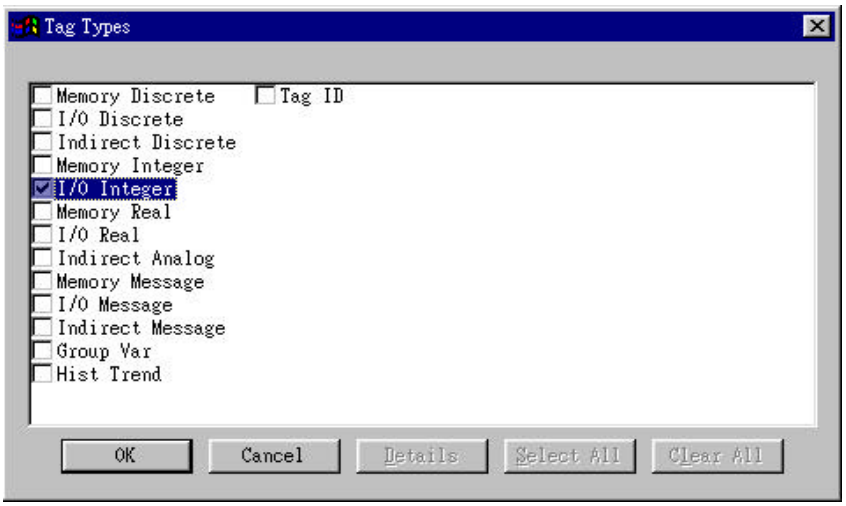


Click on this button to define a new Tag Name



Enter the Tagname in this field. (The tagname defined here is the name **InTouch** will use. The NuDAM-6000 DDE Server does not see this name. The item name that NuDAM-6000 DDE Server uses is defined in *Item Name* field, an input field in *Details* box).

Click on this button to select the tag type. The *Tag Types* dialog box is as follows:

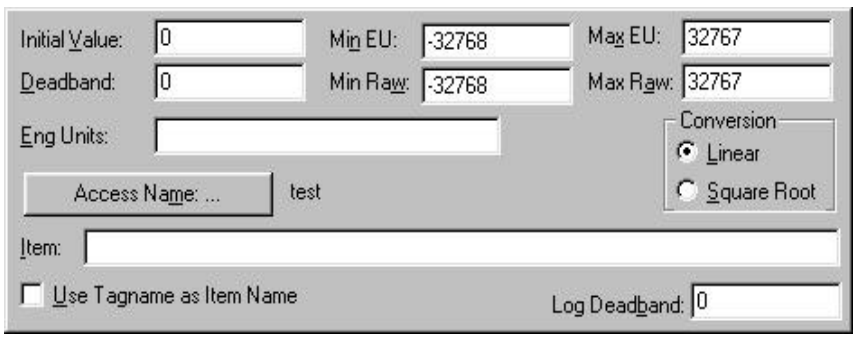


To access NuDAM-6000 DDE Server items, the type of Tagname should be *I/O* type.

There are four I/O types. They are briefly described in the following:

- **I/O Discrete**
  Discrete input/output tagname with a value of either 0 (False, Off) or 1 (True, On).
- **I/O Integer**
  A 32-bit signed integer value between -2,147,483,648 and 2,147,483,647.
- **I/O Real**
  Floating (decimal) point tagname. The floating point value may be between $-3.4e^{38}$ and $+3.4e^{38}$. All floating point calculations are performed with 64-bit resolution, but the result is stored in 32-bit.
- **I/O Message**
  Text string input/output tagname that can be up to 131 characters long.

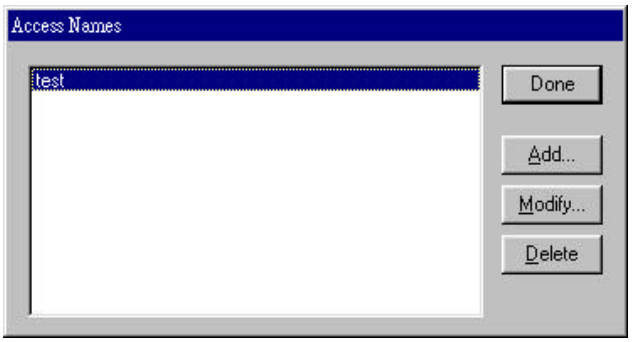
After selecting tag types, the "Details" dialog box associated to the tag type will appear:



Note: If *Details* dialog box does not appear, click Details at the top of the Tagname Dictionary dialog box.

Input all the information related to the tag name. If selecting I/O Integer or I/O Real as the type for your tagname, it is required to input the values of *Min EU*, *Max EU*, *Min Raw* and *Max Raw*.

Click on this button to define the DDE access name associated to the tagname. The A*ccess Name* dialog box is as follows:



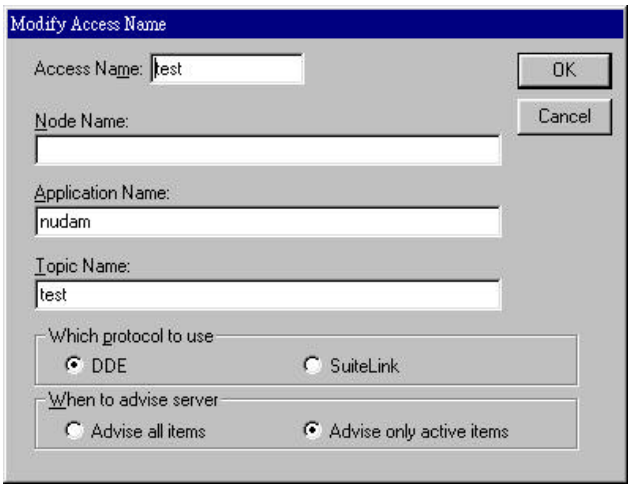
Click on this button to close the dialog box.

Click on this button to define a new DDE access name.

Click on this button to modified the selected DDE access name. An ***Modify Access Name*** dialog box will appear.

Click on this button to delete the selected DDE access name.

The following figure illustrate the *Add/Modify Access Name* dialog box:



Access Name: test

Enter an arbitrary name. InTouch uses Access Names to reference real-time I/O data of tagname associated to the Access name. (It is generally advisable that the same name defined for the NuDAM-6000 DDE topic is used here.)

Node Name:

If the data resides in a network I/O Server, type the remote node's name in the field.

Application Name: nudam

In this field, type the actual program name, ***NuDAM,*** for the NuDAM-6000 DDE Server program from which the data value will be acquired.

Note: Do not enter the .exe extension portion of the program name.

Topic Name: test

In this field, type the topic name you want to access. The "**Topic Name**" MUST be the same name used when the topics were configured in the NuDAM-6000 I/O DDE Server program.

○ **Advise all items**

Select ***Advise all items*** if you want the server program to poll for all data whether or not it is in visible windows, alarmed, logged, trended or used in a script.

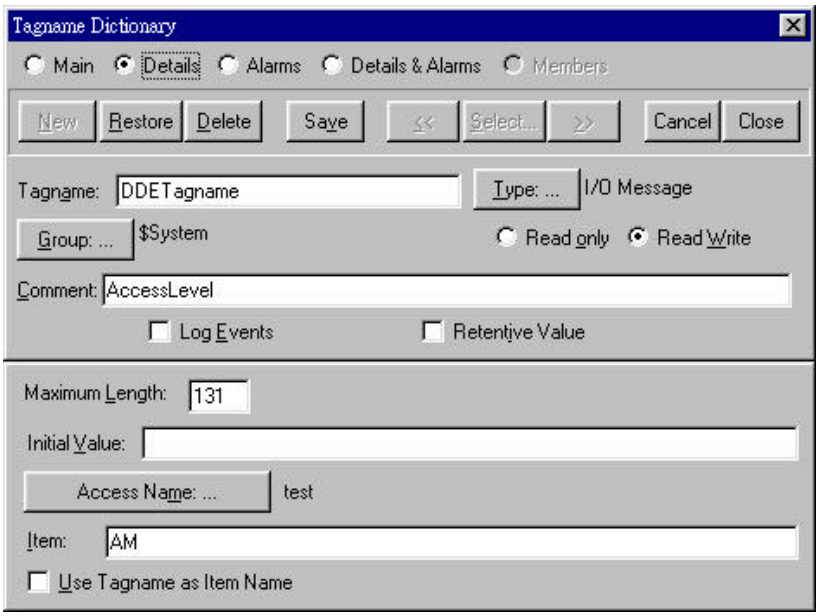
Note: Selecting this option will impact performance, therefore its use is not recommended.

◉ **Advise only active items**

Select *Advise only active items* if you want the server program to poll only points in visible windows and points that are alarmed, logged, trended or used in any script.

OK Click on this button to save the settings followed by closing the dialog box and then the Access Names dialog box will reappear. Click "*Done*" to close the dialog box and return to Tagname Dictionary dialog box and Details dialog box as the figure below.

Cancel Click on this button to cancel the command followed by closing the dialog box and then the Access Names dialog box will reappear. Click "*Done*" to close the dialog box and return to Tagname Dictionary dialog box and Details dialog box as the figure below.



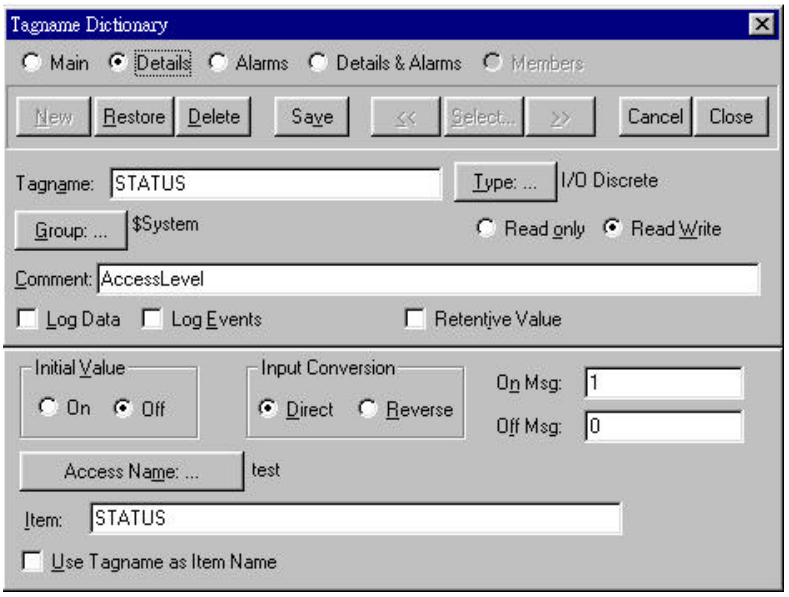
Item: AM

The last step is to define the DDE item name. In this field, type the *item name* for the desired data value in the NuDAM-6000 DDE Server. Please refer to the chapter 4 for the valid item names of each NuDAM module. For example, to access the *module name* of NuDAM6011 module, type *AM* in this field.

Note: It is important to understand that the "tagname" is the name used within InTouch to refer to a data value. The *Item* is the name used by I/O DDE Server program to refer to the same value. These names do not have to be the same, however, it is recommended when applicable to use the same names.

3.2 Monitor the Communication Status of Modules

For each module being used, there is a built-in discrete item, **Status**, that you can use to monitor the state of the communications with NuDAM module. *Status* is set to "0" when communications with the device fails and set to "1" when communications is successful. From InTouch, you can read the state of the communications by defining a tagname and associating it with the *topic* configured for the device by using the word *Status* as the item name. The following figure is an example of Tagname Definition for monitoring the status of all communication to a NuDAM module in InTouch.

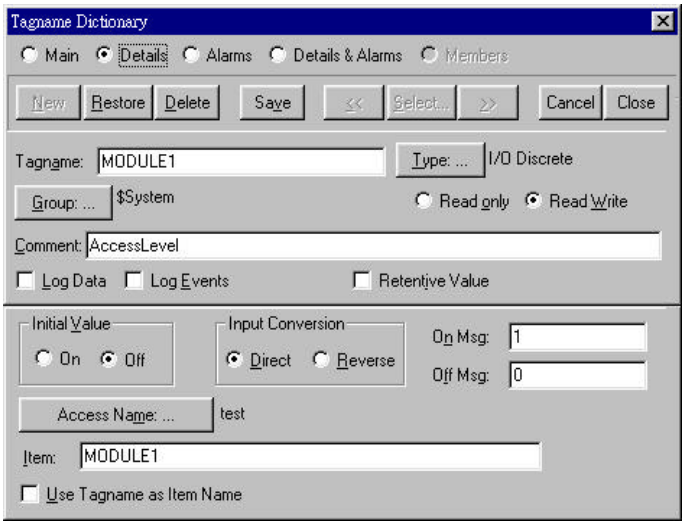


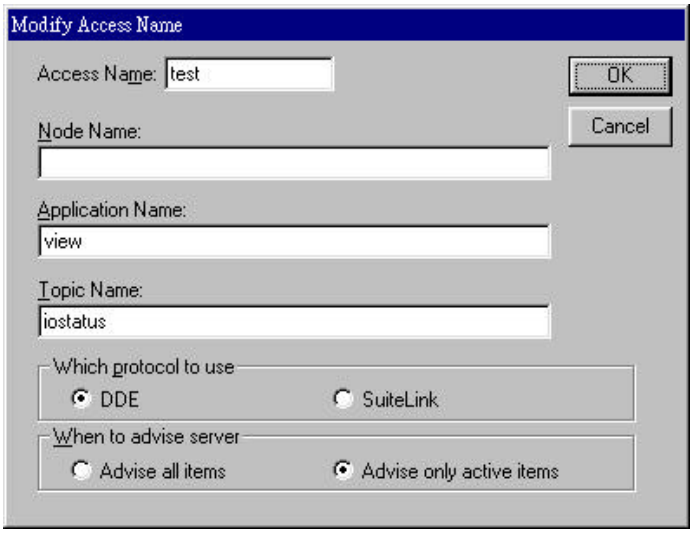
From Excel, you can read the status of the communications by entering the following formula in a cell:

=NuDAM|TopicName!'STATUS'

3.3 Monitor the Status of an DDE Conversation

InTouch also supports a built-in *topic name* called **IOStatus** (**DDEStatus** in versions prior to InTouch 7.0) that can be used to monitor the status of specific DDE conversations. When using the built-in topic **IOStatus** to monitor an I/O conversation, the item name is the actual **Topic Name** that you want to monitor. Let's assume that WindowViewer (View) is communicating with the NuDAM-6000 I/O DDE Server to a NuDAM module that has been defined in the NuDAM-6000 DDE Server with Module1 for its *topic name.* The tagname definition is as the following figures:





Excel can also be used to perform this same type of monitoring by entering the same information in a formula in a spreadsheet cell. For example, to monitor the same topic as above, the following would be entered:

=View|IOStatus!'Module1'

4

DDE Item Names In NuDAM-6000 DDE Server

The following sections list the commands and the corresponding item names and the data types of NuDAM 6000 series modules. The Special Command Set is available for all the NuDAM 6000 series modules. Except special commands, all the item names begin with an "A" character. The definition of each data type is described in section 3.1 of this manual. Please refer to the related section for the details.

4.1 Special Command Set

Command	Item Name	Requested / Poked value	R/W	Data Type
Read host watchdog status	WL	bit0: reserved bit1: Power or watchdog failure bit2: Host watchdog failure bit3: Host failure	R	Integer
Read Command Leading Code Setting	WLC	Example:$#%@~* (default)	R	Message
Read Host WatchDog / Safe Value	WD WD1 WD2	WD (Flag): Enable/Disable host watchdog timer and safe state value. 0: disable 1: enable WD1 (TimeOut): xx (01H– FFH) WD2 (SafeValue): The format depends on the module types	R	Integer Integer String

Set Host WatchDog / Safe Value	WDC	Flag: Enable/Disable host watchdog timer and safe state value. 0: disable 1: enable TimeOut: xx(01H– FFH) SafeValue: The format depends on the module types Example: 1121C	W	Message
Host is OK	WH	1	W	Discrete

4.2 NUDAM-6017, 6018

Configuration and Analog Input Command Set

Command	Item Name	Requested / Poked value	R/W	Data Type
Configuration Status	A2	TTCCFF TT:input range code CC:baud rate code FF:8-bit parameter example: 090600	R	Message
Read Firmware Version	AF	Version example: A2.10	R	Message
Read Module Name	AM	Module Name example: 6017	R	Message
Read Analog Input from Channel N	AI0.... AI7	Data: +-xxxxx. example: 1.4567	R	Real
Channel Status	A5	0 to 255	R,W	Integer
Span Calibration	A0	1	W	Discrete
Offset Calibration	A1	1	W	Discrete

* For NuDAM-6000 DDE server, using *A5* to read or set channel status, the requested or poked values must be in decimal format. However, the hexadecimal format of the requested or poked value represents the real meaning of the value. The bit 3 ~ 0 of the first character of the hexadecimal value control channel 7 ~ 4. The bit 3 ~ 0 of the second character control channel 3 ~ 0. For example, the requested data is 72 and the hexadecimal format of 72 is 0x48. ‘4’ is 0100 means enable channel 6 and disable channel 7, 5, 4. And ‘8’ is 1000 that means enable channel 3 and disable channel 2, 1, 0. Please refer to NuDAM-6017/6018 User’s Manual for the details.

The following commands are only available for NUDAM-6018

Command	Item Name	Requested / Poked value	R/W	Data Type
CJC status	A3	Data: +-xxxxx example: 36.8	R	Real
CJC Offset Calibration	A9	Counts: +-0 ~ 65535	W	Integer

4.3 NUDAM-6011, 6012, 6013, 6014D

(1) Analog Input Command Set

Command	Item Name	Requested / Poked value	R/W	Data Type
Read Analog Input / Read Analog Input from Channel 0	AAI AA1	ex: 1.6888 (for AAI) ex: 12345 (for AA1)	R	Real (AAI) Integer (AA1)
CJC Status	A3	data: +-xxxxx. example: 36.8	R	Real
Read Synchronized Data	A4	data example: 5.822	R	Real
Span Calibration	A0	1	W	Discrete
Offset Calibration	A1	1	W	Discrete
CJC Offset Calibration	A9	counts: +-0 - 65535	W	Integer

* AA1 is only valid for 6011, 6012, 6014D that support *Two's complements hexadecimal* type of data format. Since the data have been converted to be in Decimal format by NuDAM-6000 DDE Server, the data type of received data is "signed integer". Please refer to the ND-6011/6012/6014D user's manual for the details of data format for Analog output.
* A3, A9 are only valid for 6011.
* A4 is NOT available for 6013.

The following command is only available for NUDAM-6013

Command	Item Name	Requested / Poked value	R/W	Data Type
Read Analog Input from Channel N	AI0.... AI2	Data: +-xxxxx. example: 1.4567	R	Real

(2) Configuration Command Set

Command	Item Name	Requested / Poked value	R/W	Data Type
Configuration Status	A2	TTCCFF TT:input range code CC:baud rate code FF:8-bit parameter example：090600	R	Message
Read Firmware Version	AF	Version example：A2.10	R	Message
Read Module Name	AM	Module Name example：6011	R	Message

(3) Digital I/O, Alarm and Event Command Set

This command set is ONLY available for 6011, 6012 and 6014D

Command	Item Name	Requested / Poked value	R/W	Data Type
Synchronized Sampling	AS	1	W	Discrete
Read Digital In	ADI	0 or 1	R	Integer
Digital Out	ADO	0 to 3 example: $3=11_2$, indicates both of the status of DO 0 and DO1 are on	R,W	Integer
Alarm Status	AEA	0 to 2	R,W	Integer
Read Event Counter	ARE	data: 00000 – 65535	R	Integer
High Alarm Value	AH	data: high alarm example: 2.05	R,W	Real
Low Alarm Value	AL	data: low alarm example: -0.375	R,W	Real
Clear Latch Alarm	ACA	1	W	Discrete
Clear Event Counter	ACE	1	W	Discrete

* For InTouch, the value of Nth bit of ADO can be poked by using Tag.0N as the item name. For example, to poke the value of the 0th bit of ADO, set tagname as Tag.00, or to poke the value of the 1st bit of ADO, set tagname as Tag.01.

(4) Data Conversion and Display Command Set

This command set is ONLY available for 6014D

Command	Item Name	Requested / Poked value	R/W	Data Type
Read/Write Source High/Low Values for Linear Mapping	A3	Data format: (low_value)(high_Value) example: +04.000+20.000	R,W	String
Read/Write Target High/Low Values for Linear Mapping	A5	Data format: (low_value)(high_Value) example: +000.00+200.00	R,W	String
Enable/Disable Linear Mapping	AA	0 or 1	R,W	Discrete
Select LED Data Origin	A8	1 or 2	W	Integer
Send LED Data	A9	Data:+-xxxxx. Max. value:19999 example: 1999.9	W	Real

4.4 NUDAM-6021

Configuration and Analog Output Command Set

Command	Item Name	Requested / Poked value	R/W	Data Type
Configuration Status	A2	TTCCFF TT:input range code CC:baud rate code FF:8-bit parameter example：090600	R	Message

Read Firmware Version	AF	Version example: A2.10	R	Message
Read Module Name	AM	Module Name example: 6021	R	Message
Reset Status	A5	S: 0,1	R	Discrete
Last Value Readback	 A6 A6H	Data ex: 02.000 (for A6) ex: 2047 (for A6H)	R	 Real (A6) Integer (A6H)
Current Readback	 A8 A8H	Data ex: 18.773 (for A8) ex: 2047	R	 Real (A8) Integer (A8H)
Analog Data Out	 AAO1 AAO2 AAO3	Format*: ex: 12.345 (xx.xxx) ex: 023.45 (xxx.xx) ex: 4095 (xxxx)	W	 Real (AAO1) Real (AAO2) Integer (in decimal format, AAO3)
4 mA Calibration	A0	1	W	Discrete
20 mA Calibration	A1	1	W	Discrete
Trim Calibration	A3	counts: 0 – 95 or 161 – 255*	W	Integer
Save Power on AO Value	A4	1	W	Discrete

* For using A3 to perform Trim Calibration, the relationship between the number of counts to increase or decrease the output current and the poked values is as follows:

counts 0 – 95 : 0 to +95 counts (increase)

counts 161-255: -95 to –1 counts (decrease)

* NuDAM-6021 supports three types of data format. Please refer to the NuDAM6021 user' s manual for the details of data format for Analog output. For NUDAM-6000 DDE server, the relationship between item names and data format is listed in the following table:

Data Format	Item Name
Engineering Units	AAO1
Percent of FSR	AAO2
Hexadecimal Format	AAO3

Though AAO3 is the item name for AO in Hexadecimal Format, the poked data MUST been in DECIMAL format. NuDAM-6000 DDE Server will convert the poked data to be Hexadecimal format before the data sent to NuDAM module. The valid range of poked data is from 0 to 4095.

4.4 NUDAM-6024

Configuration and Analog Output Command Set

Command	Item Name	Requested / Poked value	R/W	Data Type
Configuration Status	A2	TTCCFF TT:input range code CC:baud rate code FF:8-bit parameter example：090600	R	Message
Read Firmware Version	AF	Version example: A2.10	R	Message
Read Module Name	AM	Module Name example: 6024	R	Message
Reset Status	A5	S: 0,1	R	Discrete
Digital In	ADI	0 to 127	R	Integer
Digital In from Channel N*	ACI0..ACI6	0 or 1	R	Integer
Synchronized Sampling	AS	1	W	Discrete
Read Synchronized Data status	A8S	0 or 1	R	Discrete
Read Synchronized Data	A8	0 to 127	R	Integer
Last Value Readback for the specified port	A6A A6B A6C A6D	A6A: output port A A6B: output port B A6C: output port C A6D: output port D Data: ex: 02.000	R	Real
Analog Data Out*	AAOA, AAOB, AAOC, AAOD	AAOA: output port A AAOB: output port B AAOC: output port C AAOD: output port D Data: ex: 12.345 (xx.xxx)	W	Real
Trim Calibration	A3	counts: 0 – 95 or 161 – 255*	W	Integer
Save Power on AO Value	A4	1	W	Discrete

* For using A3 to perform Trim Calibration, the relationship between the number of counts to increase or decrease the output current and the poked values is as follows:

counts 0 – 95 : 0 to +95 counts (increase)

counts 161-255: -95 to –1 counts (decrease)

* NuDAM-6024 only supports engineering format.

* "ACIn" (n is the channel number) command is used for the n-th channel digital data input.

4.5 NUDAM-6050, 6052, 6053, 6054, 6060, 6063

Configuration and Digital I/O Command Set

Command	Item Name	Requested / Poked value	R/W	Data Type

Configuration Status	A2	TTCCFF TT:input range code CC:baud rate code FF:8-bit parameter example: 090600	R	Message
Read Firmware Version	AF	Version example: A2.30	R	Message
Read Module Name	AM	Module Name example: 6050	R	Message
Synchronized Sampling	AS	1 ***this command is only available for NUDAM-6050, 6052, 6053, 6054 and 6060***	W	Discrete
Digital Data In	ADI	0 to 255: 6050, 6052 0 to 65535: 6053 0 to 32767: 6054 0 to 15: 6060 ***this command is only available for NUDAM-6050, 6052, 6053, 6054 and 6060*** example: 3=00000011$_2$, indicates the status of DO 0 and DO 1 are on and the others are off.	R	Integer
Digital In from Channel N*	ACI0..ACI15	0 or 1 ***this command is only available for NUDAM-6050, 6052, 6053, 6054 and 6060***	R	Integer
Digital Data Out	ADO	Data: 0 to 255 for ***NUDAM-6050*** Data: 0 to 15 for ***NUDAM-6060*** Data: 0 to 255 for ***NUDAM-6063*** example: 8=00001000$_2$, indicates DO3 is on, and the others are off.	R,W	Integer
Digital Data Out for Channel N*	ACO0..ACO7	0 or 1 ***this command is only available for NUDAM-6050, 6060 and 6063***	R,W	Integer
Reset Status	A5	S: 0, 1	R	Discrete
Read Synchronized Data Status	A4	0 or 1 ***this command is only available for NUDAM-6050, 6052, 6053, 6054 and 6060***	R	Discrete

* For InTouch, the value of Nth bit of ADI/ADO can be requested/poked by using Tag.0N as the item name. For example, to request the value of the 0th bit

of ADI for NuDAM-6050, set tagname as Tag.00, or to request the value of the 3th bit of ADI for NuDAM-6050, set tagname as Tag.03.

* "ACIn" and "ACOn" (n is the channel number) commands are used for the n-th channel digital data input and output individually.

4.6 NUDAM-6056, 6058

Configuration and Digital I/O Command Set

Command	Item Name	Requested / Poked value	R/W	Data Type
Configuration Status	A2	TTCCFF TT:input range code CC:baud rate code FF:8-bit parameter example: 090600	R	Message
Read Firmware Version	AF	Version example: A2.30	R	Message
Read Module Name	AM	Module Name example: 6050	R	Message
Synchronized Sampling	AS	1 this command is ***only available for NUDAM-6058***	W	Discrete
Digital Data In for DI channels	ADI	0 to 15: 6058 this command is ***only available for NUDAM-6058*** example: $3=0011_2$, indicates the status of DO 0 and DO 1 are on and the others are off.	R	Integer
Digital Data In for a specified port	ADIA, ADIB, ADIC	0 to 255 this command is ***only available for NUDAM-6058*** example: $3=00000011_2$, indicates the status of DO 0 and DO 1 are on and the others are off.	R	Integer
Digital Data In for all the DI channels and ports	ADIT	0 to 268435455 this command is ***only available for NUDAM-6058***	R	Integer
Digital In from Channel N	ACI0..ACI27*	0 or 1 ***this command is only available for NUDAM-6058***	R	Integer

Digital Data Out for the specified port	***For 6056*:** ADOH, ADOL ***For 6058*:** ADOA, ADOB, ADOC	For ADOH: Data: 0 to 127 For ADOA, ADOB, ADOC and ADOL: Data: 0 to 255 example: $8=00001000_2$, indicates DO3 is on, and the others are off.	R,W	Integer
Digital Data Out for all Ports	ADOT	Data: 0 to 32767 for NUDAM 6056 Data: 0 to 16777215 for NUDAM 6058	R,W	Integer
Digital Data Out for channel N of a specified port	***For 6056*:** ACOH0..ACOH7 ACOL0..ACOL7 ***For 6058*:** ACOA0..ACOA7 ACOB0..ACOB7 ACOC0..ACOC7	Data: 0 or 1	R,W	Integer
Set Programmable I/O Mode	APIO	Data: 0 to 15 this command is ***only available for NUDAM-6058***	R,W	Integer
Reset Status	A5	S: 0, 1	R	Discrete
Read Synchronized Data Status	A4	0 or 1 this command is ***only available for NUDAM-6058***	R	Discrete

* For InTouch, the value of Nth bit of ADI/ADO can be requested/poked by using Tag.0N as the item name. For example, to request the value of the 0th bit of ADI for NuDAM-6050, set tagname as Tag.00, or to request the value of the 3th bit of ADI for NuDAM-6050, set tagname as Tag.03.
* "ACIn" and "ACOpn" (p is the port number and n is the channel number) commands are used for the n-th channel digital data input and n-th channel digital data output from output port p individually.

4.7 NUDAM-6080

(1) Configuration, Counter Input and Display Command Set

Command	Item Name	Requested / Poked value	R/W	Data Type
Configuration Status	A2	TTCCFF TT:input range code CC:baud rate code FF:8-bit parameter example: 090600	R	Message

Read Firmware Version	AF	Version example: B2.10	R	Message
Read Module Name	AM	Module Name example: 6080	R	Message
Input Signal Mode	AB	S: 0, 1	R, W	Discrete
Read Counter/ Frequency Value of counter 0 or Counter 1 in Hexadecimal	A0 or A1	Data: xxxxxxxx example: 00002FFF	R	Message
Read Counter/ Frequency Value of counter 0 or Counter 1 in Decimal	A0D or A1D	Data: xxxxxxxxxx example: 1234567890	R	Real

(2) Counter Setup Command Set

Command	Item Name	Requested / Poked value	R/W	Data Type
Gate Mode	AA	G: 0, 1, 2	R, W	Integer
Maximum Counter Value of counter 0 or Counter 1 in Hexadecimal	A30 or A31	Data: xxxxxxxx example: 0000FFFF	R, W	Message
Maximum Counter Value of counter 0 or Counter 1 in Decimal	A0C or A1C	Data: xxxxxxxxxx Example: 4294967295	R, W	Real
Initial Counter value of counter 0 or Counter 1 in Hexadecimal	AG0 or AG1	Data: xxxxxxxx Example: 000000FF	R, W	Message
Initial Counter value of counter 0 or Counter 1 in Decimal	A0E or A1E	Data: xxxxxxxxxx Example: 255	R, W	Real
Counter Start/Stop Status of counter 0 or Counter 1	A50 or A51	S: 0, 1	R, W	Discrete
Read then Clear the Overflow Flag of counter 0 or Counter 1	A70 or A71	V: 0, 1	R	Discrete
Clear Counter	A6	N: 0, 1	W	Discrete

(3) Digital Filter & Programmable Threshold Command Set

Command	Item Name	Requested / Poked value	R/W	Data Type
Digital Filter Status	A4	S: 0, 1	R, W	Discrete
Minimum Input Signal Width at High Level	A0H	Data: 4 – 1024	R, W	Integer
Minimum Input Signal Width at Low Level	A0L	Data: 4 – 1024	R, W	Integer
TTL Input High Trigger Level	A1H	Data: 1 – 50	R, W	Integer
TTL Input Low Trigger Level	A1L	Data: 1 – 50	R, W	Integer

(4) Digital Output & Alarm Command Set

Command	Item Name	Requested / Poked value	R/W	Data Type

Enable/Disable Alarm Status of Counter0 or Counter1	AE0 or AE1	S: 0, 1 where 0: disable alarm 1: enable alarm	W	Discrete
Read Alarm Status	AEA	S: 0 – 3 Example: $3 = 11_2$, indicates that the alarm status of counter 0 and counter 1 are enabled.	R	Integer
Alarm Limit Value of Counter 0 in Hexadecimal	APA	Data: xxxxxxxx Example: F0000000	R, W	Message
Alarm Limit Value of Counter 0 in Decimal	APD	Data: xxxxxxxxxx Example: 4026531840	R, W	Real
Alarm Limit Value of Counter 1 in Hexadecimal	ASA	Data: xxxxxxxx Example: F0000000	R, W	Message
Alarm Limit Value of Counter 1 in Decimal	ASD	Data: xxxxxxxxxx Example: 4026531840	R, W	Real
Digital Output Value	ADO	Data: 0 – 3 Example: $3 = 11_2$, indicates that the status of DO0 and DO1 are on.	R, W	Integer

4.8 Table for All Items

All the Item names used by ***NuDAM-6000 I/O DDE Server*** are listed in the following table:

Command	**Item Name**	**Module Name**	**R/W**	**Data Type**
Span Calibration 4 mA Calibration	A0	6011, 6012, 6013, 6014D, 6017, 6018, 6021	W	Discrete
Read Counter/ Frequency Value of Counter 0 in Hexadecimal	A0	6080	R	Message
Read Counter/ Frequency Value of Counter 1 in Hexadecimal	A1	6080	R	Message
Offset Calibration 20 mA Calibration	A1	6011, 6012, 6013, 6014D, 6017, 6018, 6021	W	Discrete
Configuration Status	A2	6011, 6012, 6013, 6014D, 6017, 6018, 6021, 6024, 6050, 6052, 6053, 6054, 6056, 6058, 6060, 6063, 6080	R	Message
CJC Status	A3	6011, 6018	R	Real
Trim Calibration	A3	6021, 6024	W	Integer

Read/Write Source High/Low Values for Linear Mapping	A3	6014D	R,W	String
Read Synchronized Data	A4	6011, 6012, 6014D	R	Real
Save Power on AO Value	A4	6021, 6024	W	Discrete
Read Synchronized Data Status	A4	6024, 6050, 6052, 6053, 6054, 6058, 6060	R	Discrete
Digital Filter Status	A4	6080	R, W	Discrete
Read,Enable/Disable Channels for Multiplexing	A5	6013, 6017, 6018	R, W	Integer
Reset Status	A5	6021, 6024, 6050, 6052, 6053, 6054, 6056, 6058, 6060, 6063	R	Discrete
Read/Write Target High/Low Values for Linear Mapping	A5	6014D	R,W	String
Last Va lue Readback	A6 A6H	6021	R	Real (A6) Integer (A6H)
Last Value Readback	A6A… A6D	6024	R	Real
Clear Counter	A6	6080	W	Discrete
Current Readback	A8 A8H	6021	R	Real (A8) Integer (A8H)
Select LED Data Origin	A8	6014D	W	Discrete
Read Synchronized Data	A8	6024	R	Integer
Read Synchronized Data status	A8S	6024	R	Discrete
Send LED Data	A9	6014D	W	Real
CJC Offset Calibration	A9	6011, 6018	W	Integer
Maximum Counter Value of counter 0 in Hexadecimal	A30	6080	R, W	Message
Maximum Counter Value of Counter 1 in Hexadecimal	A31	6080	R, W	Message
Counter Start/Stop Status of Counter 0	A50	6080	R, W	Discrete
Counter Start/Stop Status of Counter 1	A51	6080	R, W	Discrete
Read then Clear the overflow flag of counter 0	A70	6080	R	Discrete
Read then Clear the overflow flag of counter 1	A71	6080	R	Discrete
Maximum Counter Value of counter 0 in Decimal	A0C	6080	R, W	Real

Maximum Counter Value of counter 1 in Decimal	A1C	6080	R, W	Real
Read Counter/ Frequency Value of counter 0 in Decimal	A0D	6080	R	Real
Read Counter/ Frequency Value of counter 1 in Decimal	A1D	6080	R	Real
Initial Counter value of counter 0 in Decimal	A0E	6080	R, W	Real
Initial Counter value of Counter 1 in Decimal	A1E	6080	R, W	Real
Minimum Input Signal Width at Low Level	A0L	6080	R, W	Integer
Minimum Input Signal Width at High Level	A0H	6080	R, W	Integer
TTL Input Low Trigger Level	A1L	6080	R, W	Integer
TTL Input High Trigger Level	A1H	6080	R, W	Integer
Gate Mode	AA	6080	R, W	Integer
Enable/Disable Linear Mapping	AA	6014D	R,W	Discrete
Read Analog Input / Read Analog Input from channel 0	AAI AA1	6011, 6012, 6013	R	Real (AAI) Integer (AA1)
Analog Data Out	AAO1 AAO2 AAO3	6021	W	Real (AAO1) Real (AAO2) Integer (AAO3)
Analog Data Out	AAOA..AAOD	6024	W	Real
Input Signal Mode	AB	6080	R, W	Discrete
Clear Latch Alarm	ACA	6011, 6012, 6014D	W	Discrete
Clear Event Counter	ACE	6011, 6012, 6014D	W	Discrete
Digital Input from Channel N	ACI0 ..ACI27	6011, 6012, 6014D, 6024, 6050, 6052, 6053, 6054, 6058, 6060,	R	Integer
Digital Output for Channel N	ACO0 ..ACO7	6050, 6060, 6063	R, W	Integer
Digital Data Out for channel N of a specified port	ACOH0..ACOH7 ACOL0..ACOL7	6056	R,W	Integer
Digital Data Out for channel N of a specified port	ACOA0..ACOA7 ACOB0..ACOB7 ACOC0..ACOC7	6058	R,W	Integer
Digital Input	ADI	6011, 6012, 6014D	R	Discrete
Digital Input	ADI	6024, 6050, 6052, 6053, 6054, 6058, 6060	R	Integer
Digital Input from a specified port	ADIA … ADIC	6058	R	Integer

Digital Input from all the DI channels and ports	ADIT	6056, 6058	R	Integer
Digital Output	ADO	6011, 6012, 6014D, 6050, 6060, 6063, 6080	R, W	Integer
Digital Output for a specified port	ADOH, ADOL	6056	R,W	Integer
Digital Output for a specified port	ADOA, ADOB, ADOC	6058	R,W	Integer
Digital Output for all ports	ADOT	6056, 6058	R,W	Integer
Enable/Disable Alarm Status of Counter0	AE0	6080	W	Discrete
Enable/Disable Alarm Status of Counter1	AE1	6080	W	Discrete
Enable/Disable Alarm	AEA	6011, 6012	R,W	Integer
Read Alarm Status	AEA	6080	R	Integer
Read Firmware Version	AF	6011, 6012, 6013, 6017, 6018, 6021, 6050, 6052, 6060, 6080	R	Message
Initial Counter value of counter 0 in Hexadecimal	AG0	6080	R,W	Message
Initial Counter value of Counter 1 in Hexadecimal	AG1	6080	R,W	Message
Read/Set High Alarm Value	AH	6011, 6012	R,W	Real
Read Analog Input from Channel N	AI0..AI7	6013, 6017, 6018	R	Real
Read Analog Input from Channel N	AI0..AI2	6013	R	Real
Read/Set Low Alarm Value	AL	6011, 6012	R,W	Real
Read Module Name	AM	6011, 6012, 6013, 6017, 6018, 6021, 6050, 6052, 6060, 6080	R	Message
Alarm Limit Value of Counter 0 in Hexadecimal	APA	6080	R,W	Message
Alarm Limit Value of Counter 0 in Decimal	APD	6080	R,W	Real
Set Programmable I/O Mode	APIO	6058	R,W	Integer
Read Event Counter	ARE	6011, 6012	R	Integer
Synchronized Sampling	AS	6011, 6012, 6050, 6060	W	Discrete
Alarm Limit Value of Counter 1 in Hexadecimal	ASA	6080	R,W	Message

Alarm Limit Value of Counter 1 in Decimal	ASD	6080	R,W	Real
Read host watchdog status	WL	6011, 6012, 6013, 6017, 6018, 6021, 6050, 6052, 6060, 6080	R	Integer
Read Command Leading Code Setting	WLC	6011, 6012, 6013, 6017, 6018, 6021, 6050, 6052, 6060, 6080	R	Message
Read Host WatchDog / Safe Value	WD WD1 WD2	6011, 6012, 6013, 6017, 6018, 6021, 6050, 6052, 6060, 6080	R	Integer (WD) Integer (WD1) String (WD2)
Set Host WatchDog / Safe Value	WDC	6011, 6012, 6013, 6017, 6018, 6021, 6050, 6052, 6060, 6080	W	Message
Host is OK	WH	6011, 6012, 6013, 6017, 6018, 6021, 6050, 6052, 6060, 6080	W	Discrete

Appendix InTouch Sample Program

There are several InTouch sample programs provided in this software package. They could help you to program your own applications by using InTouch and NuDAM-6000 DDE Server easily. The brief descriptions of these sample programs are specified as follows:

6011Demo	NuDAM-6011 InTouch Sample Program
6012Demo	NuDAM-6012 InTouch Sample Program
6013Demo	NuDAM-6013 InTouch Sample Program
6014Demo	NuDAM-6014D InTouch Sample Program
6017Demo	NuDAM-6017 InTouch Sample Program
6018Demo	NuDAM-6018 InTouch Sample Program
6021Demo	NuDAM-6021 InTouch Sample Program
6024Demo	NuDAM-6024 InTouch Sample Program
6050Demo	NuDAM-6050 InTouch Sample Program
6052Demo	NuDAM-6052 InTouch Sample Program
6053Demo	NuDAM-6053 InTouch Sample Program
6054Demo	NuDAM-6054 InTouch Sample Program
6056Demo	NuDAM-6056 InTouch Sample Program
6058Demo	NuDAM-6058 InTouch Sample Program
6060Demo	NuDAM-6060 InTouch Sample Program
6063Demo	NuDAM-6063 InTouch Sample Program
6080Demo	NuDAM-6080 InTouch Sample Program
NudamDemo1	NuDAM 6000 Series InTouch Sample Program
NudamDemo2	NuDAM-6017, 6050 InTouch Sample Program

To run these sample programs, please follow the following steps:

Step1. Execute NuDAM-6000 DDE Server program

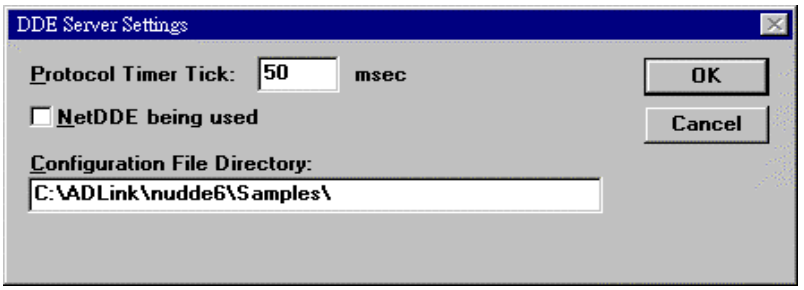
Step 2. Configure NuDAM-6000 DDE Server properly

The topic names required for each sample program have to be defined. The demo programs with their own corresponding topics are list in the following table:

Demo Program	Topic Name
6011Demo	ND6011
6012Demo	ND6012
6013Demo	ND6013
6014Demo	ND6014D
6017Demo	ND6017
6018Demo	ND6018
6021Demo	ND6021
6024Demo	ND6024
6050Demo	ND6050
6052Demo	ND6052
6053Demo	ND6053
6054Demo	ND6054
6056Demo	ND6056
6058Demo	ND6058
6060Demo	ND6060
6063Demo	ND6063
6080Demo	ND6080
NudamDemo	ND6011, ND6012, ND6013, ND6017, ND6018, ND6021, ND6050, ND6052, ND6060, ND6080
NuDemo2	ND6011, ND6050

Please refer to chapter 2 for the detailed descriptions about the NuDAM-6000 DDE Server configuration.

A configuration file "*NuDAM.cfg*", located in *Samples* directory, is provided. This configuration file defines all the topic names required for executing our sample programs. To use this configuration file, set the *configuration file path* as the directory where this configuration file is located (the default is "C:\ADLink\NuDDE6\Samples"), and then re-execute NuDAM-6000 DDE Server program.



This configuration file will be used while *NuDAM-6000 DDE Server program* is re-executed. For the configured topics fitting your system, use "/Configure/Topic Definition" command to modify the contents of the topics (e. COM port, module address, data format, ..etc.). Please refer to section 2.2.2 for the detailed descriptions about topic definition.

Step 3. Start the InTouch program (INTOUCH.EXE) and select the InTouch sample program you want to execute in the list in the **InTouch Application Manager** dialog box. If the sample programs are not shown in the list, on the **Tools** menu, click **Find Applications**. The **Starting directory for search** dialog box appears and locates the directory in which you want to search for applications, and then click **OK**. The InTouch Application Manager will reappear displaying icons for all applications that were found in the selected directory. Please refer to InTouch User' s Guide or related reference books to get the information about using InTouch.